

WHAT IS CLAIMED IS:

1. A method for producing an electrical leadframe (10) for a light-emitting diode component, the electrical leadframe having at least one first electrical connection conductor (2) and at least one second electrical connection conductor (3), the method comprising:

5 a) producing a layer composite comprising an electrically insulating carrier layer (101) and an electrically conductive connection conductor layer (102);

b) patterning of the carrier layer (101) in such a way that a contact-making window (7) to the connection conductor layer (102) is produced in said carrier layer; and

10 c) patterning of the connection conductor layer (102) in such a way that the first electrical connection conductor (2) and the second electrical connection conductor (3) are produced, and at least one of first and second electrical connection conductors can be electrically connected through the contact-making window (7).

15 2. The method as claimed in claim 1, wherein patterning of the connection conductor layer includes producing the first electrical connection conductor (2) and the second electrical connection conductor (3) such a way that an inner surface of at least one of first and second electrical connection conductors is exposed through the contact-making window.

20 3. The method as claimed in claim 1, in which step c) takes place before step b).

4. The method as claimed in claim 1, in which the carrier layer (101) consists essentially of a plastic film and the connection conductor layer (102) consists essentially of a

25 metal film.

5. The method as claimed in claim 4, in which a thickness of the carrier layer (101) is less than 80 μm .

30 6. The method as claimed in claim 5, in which the thickness of the carrier layer (101) is between from and including 30 μm and up to and including 60 μm .

7. The method as claimed in claim 4, in which a thickness of the connection conductor layer (102) is less than 80 μm .

5 8. The method as claimed in claim 7, in which the thickness of the connection conductor layer (102) is between from and including 30 μm and up to and including 60 μm .

10 9. The method as claimed in claim 1, in which patterning the carrier layer includes forming a first contact-making window (7) and a second contact-making window (8) in the carrier layer (101) leading to the first connection conductor (2) and to the second connection conductor (3), respectively.

15 10. The method as claimed in claim 1, in which the carrier layer (101) is a plastic layer that can be patterned by means of masking and etching techniques.

20 11. The method as claimed in a claim 10, in which a portion of the plastic layer (101) corresponding to at least the contact-making window (7) comprises an uncured and etchable plastic, and wherein the patterning step includes curing or incipiently curing the plastic layer except for a region (70) of the plastic layer corresponding to at least the contact-making window (7) and subsequently removing the region that was not cured or incipiently cured.

25 12. The method as claimed in claim 11, in which the patterning step includes applying a photoresist mask layer (103) to the plastic layer, patterning or applying the mask layer (103) in such a way that the region (70) of the plastic layer is covered by the mask layer (103), exposing the plastic layer and mask layer to radiation so that the plastic layer except for the region covered by the mask layer is incipiently cured or cured.

30 13. The method as claimed in claim 11, in which the patterning step includes positioning a photomask (104) above or on said plastic layer, the photomask shading the region (70) of the plastic layer, exposing the plastic layer and photomask to radiation so that

the plastic layer except for the region shaded by the photomask is cured or incipiently cured or cured, and lifting off the photomask layer (104).

5 14. The method as claimed in claim 11, in which the plastic layer is cured or incipiently cured by UV radiation (105).

15. The method as claimed in claim 11, in which the plastic layer is cured or incipiently cured by thermal radiation.

10 16. The method as claimed in claims 11, in which the plastic layer includes a polyimide monomer.

17. The method as claimed in at least one of claims 11, in which removing from the connection conductor layer (102) by means of etching (106).

15 18. The method as claimed in at least one of claim 11, in which removing the region that was not cured or incipiently cured includes etching the plastic layer.

20 19. A method for producing a leadframe strip (200) having a multiplicity of component regions (202), at least one contact-making window (7) and at least two electrical connection conductors (2, 3) being formed in each component region (202) by means of the method as claimed in claim 1.

25 20. The method as claimed in claim 19, in which the connection conductor layer (102) is at least partly removed along separating lines (110) between in each case two adjacent component regions.

30 21. A method for producing a surface-mountable semiconductor component having at least one semiconductor chip (1), at least two external electrical connection conductors (2, 3), which are connected to at least two electrical contacts (4, 5) of the

semiconductor chip (1), and having a chip housing (11) having a connection carrier (9) and a chip encapsulation (6), the method comprising:

- a) applying an electrically insulating carrier layer (101) to an electrically conductive connection conductor layer (102), patterning at least one chip window (7) and at least one wire connection window (8) in the carrier layer (101), and patterning the external electrical connection conductors (2,3) into the connection conductor layer (102);
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- b) mounting the semiconductor chip (1) into the chip window (7);
- c) electrically connecting at least one electrical contact (5) of the semiconductor chip (1) to a connection conductor (3) by means of a bonding wire (50) through the wire connection window (8);
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- d) placing the composite comprising patterned connection conductor layer (102), patterned carrier layer (101), semiconductor chip (1) and bonding wire (50) into an injection mold; and
- e) encapsulating the semiconductor chip (1) including bonding wire (50) with an encapsulation material (6) by injection molding, which material is subsequently at least partly cured or incipiently cured.
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22. The method as claimed in claim 21 for simultaneously producing a multiplicity of semiconductor components, further comprising:

20 in step a) producing an array (201) with a multiplicity of component regions (202) with in each case at least one chip window (7), at least one wire connection window (8) and at least two external electrical connection conductors (2, 3) in a composite with a connection conductor layer (102) and a carrier layer;

25 in steps b) and c), mounting a multiplicity of semiconductor chips (1) into the chip windows (7) and connecting electrical contacts (5) of the semiconductor chips (1) to external electrical connections (3) by means of a multiplicity of bonding wires (50);

30 in step d), placing the array into an injection mold (500), in which a single cavity (501) which spans all the component regions (202) of the array (201) and forms a void there essentially exclusively on the side of the semiconductor chips (1) is provided for the entire array (201);

in step e), introducing the encapsulation material (60) into the cavity (501) by injection molding and at least partly curing or incipiently curing the encapsulation material in the cavity; and

5 removing the array (201) from the injection mold (500) and singulating the array into mutually separate semiconductor components by severing the encapsulation material (60) and the carrier layer (101).

10 23. A method for producing a surface-mountable semiconductor component having at least one semiconductor chip (1), at least two external electrical connection conductors (2, 3), which are connected to at least two electrical contacts (4, 5) of the semiconductor chip (1), and having a chip housing (11) having a connection carrier (9) and a chip encapsulation (6), the method comprising:

- 15 a) applying an electrically insulating carrier layer (101) to an electrically conductive connection conductor layer (102), patterning at least one chip window (7) in the carrier layer (101), and patterning the external electrical connection conductors (2, 3) into the connection conductor layer (102), the two connection conductors (2, 3) partly overlapping the chip window (7);
- 20 b) mounting the semiconductor chip onto the external electrical connection conductors (2, 3) in the chip window (7), in such a way that a first contact (4) and a second contact (5) of the semiconductor chip (1) bear on the first (2) and, respectively, on the second of the two connection conductors (3) and are electrically connected thereto;
- c) placing the composite comprising patterned connection conductor layer (102), patterned carrier layer (101) and semiconductor chip (1) into an injection mold (500); and
- 25 d) encapsulating the semiconductor chip (1) with an encapsulation material (6) by injection molding, which material is subsequently at least partly cured or incipiently cured.

24. The method as claimed in claim 23 for simultaneously producing a multiplicity of semiconductor components using a method, further comprising:

30 in step a), producing an array (201) with a multiplicity of component regions (202) with in each case at least one chip window (7) and at least two external electrical connection

conductors (2, 3) in a composite with a connection conductor layer (102) and a carrier layer (101);

in step b), mounting a multiplicity of semiconductor chips (1) into the chip windows (7) and connecting the chips to the associated connection conductors (2, 3);

5 in step c), placing the array into an injection mold (500), in which a single cavity (501) which spans all the semiconductor chips (1) of the array (201) and forms a void there essentially exclusively on the side of the semiconductor chips (1) is provided for the entire array (201);

10 in step d), introducing an encapsulation material (60) into the cavity (501) by injection molding and at least partly curing or incipiently curing the encapsulation material in the cavity; and

removing the array (201) from the injection mold (500) and singulating the array into mutually separate semiconductor components by severing the encapsulation material (60) and the carrier layer.

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25. The method as claimed in either claim 21 or 23, in which the semiconductor chips (1) comprise light-emitting diode chips.

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26. The method as claimed in claim 25, in which the light-emitting diode chips are mounted onto the external electrical connections in rotated fashion with light-generating epitaxial layers facing toward said connections.

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27. The method as claimed in either claim 21 or 23, in which the carrier layer (101) consists essentially of a plastic film and the connection conductor layer (102) consists essentially of a metal film.

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28. The method as claimed in claim 27, in which a thickness of the carrier layer (101) is less than 80 μm .

29. The method as claimed in claim 28, in which the thickness of the carrier layer is between from and including 30 μm and up to and including 60 μm .

30. The method as claimed in claims 27, in which a thickness of the connection conductor layer (102) is less than 80 μm .

5 31. The method as claimed in claim 30, in which thickness of the connection conductor layer (102) is between from and including 30 μm and up to and including 60 μm .

10 32. The method as claimed in either claim 21 or 23, in which a first contact-making window (7) and a second contact-making window (8) are formed in the carrier layer (101), which windows lead to the first connection conductor (2) and to the second connection conductor (3), respectively.

15 33. The method as claimed in either claim 21 or 23, in which the carrier layer (101) comprises a plastic layer that can be patterned by means of masking and etching techniques.

20 34. The method as claimed in a claim 33, in which a portion of the plastic layer (101) corresponding to at least the contact-making window (7) comprises an uncured and etchable plastic, and wherein the patterning step includes curing or incipiently curing the plastic layer except for a region (70) of the plastic layer corresponding to at least the contact-making window (7) and subsequently removing the region that was not cured or incipiently cured.

25 35. The method as claimed in claim 34, in which the patterning step includes applying a photoresist mask layer (103) to the plastic layer, patterning or applying the mask layer (103) in such a way that the region (70) of the plastic layer is covered by the mask layer (103), exposing the plastic layer and mask layer to radiation so that the plastic layer except for the region covered by the mask layer is incipiently cured or cured.

30 36. The method as claimed in claim 34, in which the patterning step includes positioning a photomask (104) above or on said plastic layer, the photomask shading the

region (70) of the plastic layer, exposing the plastic layer and photomask to radiation so that the plastic layer except for the region shaded by the photomask is cured or incipiently cured or cured, and lifting off the photomask layer (104).

5 37. The method as claimed in claim 33, in which the plastic layer is cured or incipiently cured by UV radiation (105).

38. The method as claimed in claim 33, in which the plastic layer is cured or incipiently cured by thermal radiation.

10 39. The method as claimed in claim 33, in which the plastic layer includes a polyimide monomer.

15 40. The method as claimed in claim 33, in which removing the region that was not cured or incipiently cured includes etching the plastic layer.

20 41. A leadframe strip (200) having a connection conductor layer (102) and a carrier layer (101), on which an array (201) with a multiplicity of component regions (202) is formed, the connection conductor layer (101) being at least partly removed along separating lines (110) between adjacent component regions (202).

42. The leadframe strip as claimed in claim 41, in which the connection conductor layer (102) is produced from a patterned metal film.

25 43. The leadframe strip as claimed in claim 42, in which the carrier layer (101) is produced from a patterned plastic film.

44. The leadframe strip as claimed in claim 43, in which the plastic film includes a polyimide material.

45. The leadframe strip as claimed in claim 44, in which the plastic film is patterned by means of photolithography technology.